

THE IMPACT OF MARKETING MATERIAL ON THE DEMAND  
FOR MENINGOCOCCAL VACCINES

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## ABSTRACT

**Objective:** To estimate the willingness of parents in France and Germany to pay for meningococcal vaccines for their teenage children.

**Design:** A conjoint analysis survey was administered to parents who had received counseling on the nature and risks of meningococcal disease in young people. In each country, half were also randomly assigned to view a video with graphical depictions of the effects of meningococemia. Subjects were then shown a series of 18 sets of three vaccine descriptions. Each description listed the price of a hypothetical vaccine-ranging from 15 to 305 €, the duration of protection-, and the number of serogroups of the bacteria covered. The survey asked for each set of three vaccines, which vaccine was preferred, and then whether they would buy it. Conditional logit and generalized linear-random effects logit models assessed the effect of product attributes, personal background, and video viewership on the probability of indicating a purchase.

**Setting:** Recruitment through public advertisement in France and Germany.

**Participants:** 114 parents in Germany, 115 in France

**Main Outcome Measures:** Willingness to pay for vaccines

**Results:** 92.6% of subjects would purchase at least one of the vaccines they encountered. Price elasticity ranged from -1.20 (France) to -2.48 (Germany).

Exposure to graphical depictions of disease consequences negligibly increased the

overall willingness to purchase vaccine for respondents in France, but lowered the overall willingness for respondents in Germany.

**Conclusion:** In Germany and France, where there is still little out of pocket health spending, the majority of respondents stated that they would purchase meningococcal vaccines with their own money after a neutral discussion of the facts related to this disease.

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## **Introduction**

The bacteria, *Neisseria meningitidis* causes two serious and often fatal diseases: meningococcal meningitis and meningococemia. Even with appropriate treatment, meningococcal disease is fatal in between 5 to 10% of cases and leaves 15-20% of survivors with serious sequelae such as neurological impairment or limb amputation. The most frequently pathogenic strains of *N. meningitidis* are distinguished by five different polysaccharides expressed on the cellular capsule: A, B, C, Y, and W-135. Sero-groups A, B, and C account for 90% of cases with A being most prevalent in Africa, while B and C are most common in Europe and North America. Sero-groups Y and W-135 are responsible for sporadic outbreaks and are typically associated with international travel.

A polysaccharide based vaccine is available with coverage against serogroups A,C, Y, and W-135. The polysaccharide vaccines induce an antibody response that offers protection for 1-4 years. In contrast to polysaccharide vaccines, conjugated vaccines will induce both an antibody response and a cell-mediated response that is anticipated to last 10 years or more. A conjugate vaccine covering sero-group C has already been used in UK[1]. Improved conjugate vaccines covering serogroups A and C as well as A, C, Y, and W-135 are also under development.

In the U.S. vaccination against meningococcal disease is generally not covered by medical insurance. Nevertheless in the last several years the efforts of the American College Health Association and the Meningitis Foundation of America and other have led to increased awareness of the heightened risk of college students. Sales of meningococcal vaccine have risen dramatically based on out of pocket payments on behalf of college students. Other than a mass campaign among infants in UK, very little meningococcal vaccine is sold in Europe.

The economic evaluation of meningococcal vaccination strategies has heretofore relied entirely on models of the value of the vaccine in terms of the medical costs of prevented disease. An influential paper by investigators at the Centers for Disease Control concluded that a policy to vaccinate all U.S. college students would cost \$56.2 million and would prevent \$500,000 of treatment costs and, assuming ad hoc a \$1 million value for a statistical life, would prevent \$9 million worth of premature death costs [2]. The authors' conclusion that vaccination was not cost-beneficial relied heavily on the assumption of a low value for statistical life. In fact, the range of empirical estimates for the value of a statistical life includes several estimates in excess of the threshold value of \$6.1 million required to conclude that meningococcal vaccination was cost-beneficial [3].

The need to place a dollar value on human life is an inescapable feature of both cost-benefit and cost-effectiveness methods[4]. One advantage of using a survey approach such as the one described here is that the valuation process can be left to patients and their families instead of being usurped by policymakers. Rather than making assumptions about the value of human life, this study will apply the methods of conjoint analysis to inform parents about the effect of meningococcal vaccine on their child's risk of death and disability and then assess parents' willingness to pay out of pocket for this product. In order to ascribe authority to consumers in making these important value judgments it is critical that the informants in these studies have a firm understanding of the health consequences that would ensue from their choices. As applied here, the cost-benefit paradigm shifts from policymakers deciding whether private health benefits are worth public funds to a paradigm where families decide whether private health benefits are worth private funds. With this new paradigm it is possible to assess how the level of information about the

pharmaceutical, the possible fear and dread of the disease, and the socioeconomic background of the parents affects their assessment of costs and benefits.

The objective of this study is to establish the effects of price, vaccine characteristics and the parents' informational state on whether parents would purchase meningococcal vaccines out of pocket for their teenage children. The study will show that draconian efforts to inform consumers about the dreaded nature of disease consequences might have paradoxical effects on their purchase decisions.

## **Methods**

### Data

A sample of 229 parents was recruited with 114 in Germany and 115 in France (Figure 1). Advertisements were placed in GP offices informing potential subjects that their assistance was needed in a research study. The topic of meningococcal vaccines was not mentioned in recruitment. All subjects received a standardized short introduction in lay terms about the nature of meningococcal disease and the properties of vaccines that protect against the disease. The presentation included information about the epidemiology of meningococcal disease, distribution of sero-groups throughout the world as well as descriptions of the frequency and severity of complications including amputation, brain damage, and death. Within each country half of the subjects were randomly assigned to view a 5 minute video presentation featuring photographs of a young college student before and after suffering multiple amputations due to a case of meningitis [5].

Each of the two versions of the survey instrument consisted of a set of 18 opportunities to confront 3 vaccine descriptions listing the price, duration of effect, and number of serogroups

covered by candidate vaccines. The price range was ( 15, 76 , 122 , 183, and 304 ) expressed in the local currency of each country. The two durations of vaccine efficacy tested were 4 years and 10 years. The serogroup options tested were C, AC, and ACYW-135. All subjects were told to accept that they would have to pay for the vaccine themselves because it is not reimbursed. All subjects were told to accept that all the vaccines were efficacious; all could have local side-effects in very rare cases, and that only one injection would be required. After viewing the 3 options, subjects were asked, From these 3 cards, which vaccine would you PREFER? The subsequent question was Would you actually buy this vaccine? which could be coded yes or no. Sawtooth software was used to ensure that the set of 18 choices in each version represented an orthogonal design[6, 7]. Each version included one choice set in which one vaccine clearly dominated the other two a choice having a longer duration, more serogroups, and lowest price. Subjects who preferred dominated vaccines were flagged and subsequent analyses were done that could include or exclude these subjects.

### **Statistical Analysis**

The evaluation of each of these 54 vaccines (18 sets × 3 vaccines per set) always occurred in the context of exactly 2 competitor vaccines. The respondents indicated both which vaccine they preferred and in a separate question, whether or not they would buy the preferred one. This analysis studies the response to the second question. One model for this exercise would be a set of three equations governing the subject s response to each vaccine set.

$$\text{Pr}(\text{Buy A})=C+\beta_{\text{APA}}P_A+\beta_{\text{BPB}}P_B+\beta_{\text{CPC}}P_C+\beta_{\text{ADA}}\text{Dur}_A+\beta_{\text{ADB}}\text{Dur}_B+\beta_{\text{ADC}}\text{Dur}_C+\beta_{\text{ASA}}S_A+\beta_{\text{ASB}}S_B+\beta_{\text{ASC}}S_C+\beta_{\text{A}}X_i$$

$$\text{Pr}(\text{Buy B})=C+\beta_{\text{BPA}}P_A+\beta_{\text{BPB}}P_B+\beta_{\text{BPC}}P_C+\beta_{\text{BDA}}\text{Dur}_A+\beta_{\text{BDB}}\text{Dur}_B+\beta_{\text{BDC}}\text{Dur}_C+\beta_{\text{BSA}}S_A+\beta_{\text{BSB}}S_B+\beta_{\text{BSC}}S_C+\beta_{\text{B}}X_i$$

$$\text{Pr}(\text{Buy C})=C+\beta_{\text{CPA}}P_A+\beta_{\text{CPB}}P_B+\beta_{\text{CPC}}P_C+\beta_{\text{CDA}}\text{Dur}_A+\beta_{\text{CDB}}\text{Dur}_B+\beta_{\text{CDC}}\text{Dur}_C+\beta_{\text{CSA}}S_A+\beta_{\text{CSB}}S_B+\beta_{\text{CSC}}S_C+\beta_{\text{C}}X_i$$

Here probability of buying A is symbolized  $\Pr(\text{Buy}A)$  and  $P_A$ ,  $P_B$ , and  $P_C$  are the prices of A, B, and C respectively.  $\text{Dur}_A$ ,  $\text{Dur}_B$ , and  $\text{Dur}_C$  are the years of duration of protection of the 3 respective vaccines. The respective numbers of serogroups covered,  $S_A$ ,  $S_B$ , and  $S_C$  would be 4 for the ACYW-135 vaccine, 2 for the AC vaccine and 1 for the C vaccine. A vector of covariates common to each subject is represented by  $X_i$  and includes measures of income, perceived risk, and knowledge of vaccines. In general each choice was governed by 9 product attributes: own price, own duration, own serogroup and price, duration, and serogroups of 2 alternative choices. Thus a more general model would be:

$$\Pr(\text{Buy } Y_j) = C + \beta_P P_{\text{own}} + \beta_{p1} P_1 + \beta_{p2} P_2 + \beta_D \text{Dur}_{\text{own}} + \beta_{D1} \text{Dur}_1 + \beta_{D2} \text{Dur}_2 + \beta_S S_{\text{own}} + \beta_{S1} S_1 + \beta_{S2} S_2 + \beta_A X_i$$

Where subscript  $j$  denotes purchasing vaccine A, B, or C and subscript  $\text{own}$  denotes the product's own price, own duration, and own serocoverage, and subscript  $s_1$  and  $s_2$  denote the respective attributes of alternatives 1 and 2. A naïve model would simply apply logistic regression analysis to this model and ignore the fact that any choice to buy a vaccine will be correlated with at least two other choices to buy a vaccine because the vaccine descriptions came in a set of three. Besides intra-choice set correlation there could also be intra-subject correlation. To correct for correlated error terms a simple approach would use robust standard errors [8] which cluster on each constellation of vaccine set and subject. There are potentially 18 vaccine sets times 228 subjects = 4104 of these clusters. Alternatively a conditional logit model [9] could be used to account for the study design wherein the choice of any vaccine occurred in the context of 2 other competitors.

$$\text{Prob}(Y_i=j) = \frac{e^{b'z_{ij}}}{\sum_{j=1}^3 e^{b'z_{ij}}}$$

There are two potential drawbacks of the conditional logit model. One drawback is the problem of independence of irrelevant alternatives. If a fourth vaccine identical to one of the two vaccines were added in each set of the 18 vaccines this should not alter the probability of purchase of the non-identical vaccines. In other words if the probability of buying vaccine C was 30% to start with, adding vaccine D which is exactly like vaccine C should leave the probability of buying A and B unchanged. Conditional logit models are often not robust to this sort of problem particularly when the alternatives are close substitutes, which is true in this case. Another problem due to our study design is that there are 18 repeated observations for each subject and a failure to account for intra-subject correlation in responses could artificially inflate estimates of the standard errors.

An alternative approach used here accounts for question-specific and subject-specific error terms as well the presence of variable alternative choices. Our generalized linear model includes 2 separate random effects: a question specific random effect, and a subject specific random effect and takes the form

$$E(Y) =$$

$$g^{-1}[\beta_P P_{own} + \beta_{P1} P_1 + \beta_{P2} P_2 + \beta_D Dur_{own} + \beta_{D1} Dur_1 + \beta_{D2} Dur_2 + \beta_S S_{own} + \beta_{S1} S_1 + \beta_{S2} S_2 + \beta_{AX} X] + (\mu_{Question} + \mu_{Subject} + \epsilon)]$$

where  $g^{-1}()$  is an inverse link function and  $(\mu_{Question} + \mu_{Subject})$  are separate random effects associated with each of the 18 questions and each of the 228 subjects. In order to estimate this model using maximum likelihood methods the link function is assumed to be the logistic function and the family of distributions is assumed to be binomial. The `gllam6` program in Stata estimates generalized

linear models with random effects using adaptive quadrature [10]. A priori it is expected that a failure to account for random effects associated with each question and subject will lead to biased parameter estimates, however the extent of the bias can be assessed using a Hausman test [11].

In order to interpret the coefficients, post-test transformations are used. The delta method is used to calculate own price and cross price elasticities. These arc elasticities have the conventional interpretation: the percentage increase in probability of buying from a percentage decrease in price. The elasticity will only be valid around the means of all of the covariates in the sample. It will reflect the response to one vaccine in an environment where there are 2 alternatives each with the mean price, duration, and serogroup coverage of the products on the 18 sets of vaccines. It will also reflect the mean income and perceived risk characteristics of the sample.

## **Results**

Table 1 lists the means, percentages, and standard deviations of the analytical sample. Note that 54 subjects preferred dominated vaccines and were dropped from the analyses presented here. Separate analyses (not shown) retained these subjects and the findings were not dramatically different whether or not these subjects are retained. The majority of subjects (92.6%) indicated that they would buy vaccine for at least one of the prices ( 15 to 304) they encountered on the vaccine descriptions. (See Figures 2 and 3).

The different samples or parents were comparable within country with the exception that for unclear reasons the German video viewers were less likely to comprehend the meaning of term serogroup and the French video viewers were less likely to prefer dominated offerings. The

German population had a statistically significantly different income from the French population. Multivariate methods controlled for all of these potential confounders. The respondents gained a surprisingly high comprehension of the technical issues surrounding meningococcal vaccines – 61% could state what a serogroup was. The subjectively perceived risk of meningitis was quite accurate – the median and modal response that 5 university students out of 50,000 would succumb to the disease in a 5 year period was exactly correct. The mean response that 7.7 students would succumb was also quite close to correct and translates to a perceived rate of 3.08 cases per 100,000 person years. Figure 2 and 3 display the adjusted proportion that would buy vaccine at various prices and confirm the above. These figures, which are based on the parameters displayed later in Table 6, estimate the response to a vaccine with 10 year duration, covering 4 serogroups, holding fixed the two competing vaccines at 7 years duration, and coverage of 2 serogroups. They confirm probabilities of purchase as high as 60% and 91% depending on price.

Tables 2 through 5 display the results of a stratified analysis using 4 separate samples: French subjects with video (Table 2), French subjects without video (Table 3), German subjects with video (Table 4), and German subjects without video (Table 5). In each table the first regression model used is the naïve logit, followed by the conditional logit. The third column displays the coefficients of a naïve logit model augmented with data about each subject and the fourth column shows the elasticities emerging from column 3. The Hausman tests favored the conditional logit model in two of the 4 samples. The information about the subject had only a negligible effect on the responses to the product attributes. For convenience the general pattern in WTP and own price elasticity is summarized below.

	Own Price Elasticity
France Group 1 (Video)	-1.242
France Group 2	-1.204
Germany Group 1 (Video)	-1.872
Germany Group 2	-2.478

As expected, the probability of purchase was increased for products with longer duration and greater antigenic protection. It was also increased when competitors had high prices, short duration, and less antigenic protection. Income and perceived risk had inconsistent effects on the probability of purchase across the four samples. Knowing what a serogroup is consistently lowered the probability of purchase – it is unclear why this occurred.

The key findings are that the German and the French study populations have markedly different price elasticities with the German respondents being more price sensitive than the French. Furthermore viewing the video appears to have a stronger effect in German viewers where it makes demand less sensitive to price changes. For German respondents the video appears to shift the demand curve downward while tilting the slope towards less elasticity (Figure 3) . For French respondents the video appears to shift the demand curve slightly upward, but has little effect on elasticity (Figure 2). Table 6 displays the results of the generalized linear model and uses an interaction term between video exposure and own price. This table confirms and clarifies the above findings: the interaction effect of video exposure and price shows that video exposure makes demand less price sensitive in the German sample, but not in the French sample. Video exposure independently reduces the overall likelihood of purchase in the German respondents, and increases the overall likelihood of purchase in the French respondents.

## **Discussion**

The unadjusted results of this survey revealed that 93% of parents said they would purchase at least one meningococcal vaccine product for their child. The survey-based responses of parents are at odds with a prior cost-benefit analysis of meningococcal vaccine which concluded that vaccinating teenagers was not cost-beneficial [2]. Were the parents misinformed?

The exit questions on the survey showed that parents did not greatly overestimate the probability of meningitis. Furthermore higher subjective estimates of the risk of meningitis did not consistently predict an increased willingness to purchase vaccine. Nor is it likely that the parents imagined the pain and suffering of meningococcal disease was worse than it actually was. Viewing graphical depictions of disease consequences had an inconsistent, and in the German viewers, a negative effect on the probability of purchase. Putting aside misinformation, there are better explanations for the high willingness of European parents to purchase a product deemed not cost-beneficial by a team of economists.

It is possible that the scope of options considered by the parents (Do nothing vs. Buy a Vaccine) led to a greater willingness to purchase than if the parents were confronted with do nothing vs. a long list of investments they could make to improve their child's health and safety. Was the contingent situation so unreal as to make the parent's responses invalid? The contingent purchase decision faced by the European parents in the survey bears a strong resemblance to the actual decisions faced by U.S. parents where 18 states have passed laws requiring physicians to discuss the facts about meningococcal disease with parents of college students [12]. None of these parents are required to vaccinate their children, yet all of them must decide whether to do nothing or buy a vaccine which is seldom reimbursed by insurance. The polysaccharide, tetravalent vaccine price in

the U.S. is around \$65, and protection lasts about 4 years. Sales of the vaccine have been growing by as much as 53% since the passage of legislation began .

The real world choices of many informed U.S. parents to voluntarily purchase a vaccine for meningococcal disease suggests that parental interest in meningococcal vaccination uncovered here is not just a phenomenon attributable to survey design. The positive responses of the survey respondents and U.S. parents suggest that households value the life of a child at rates greater than \$1 million. Unvaccinated children face a fatality risk of 2 per million per year (assuming a meningococcal disease attack rate of 2 per 100,000 person years and a case fatality rate of 10%). Rational parents who only valued the lives of their children at \$1 million would never pay more than \$15.44 to eliminate meningococcal risk because \$15.44 is the present value of 10 years of protection against a 2 per million annual risk of losing an asset worth \$1 million. Either parents value statistical lives of their children more dearly than \$ 1 million or the rational choice model is incomplete or both. We believe the answer is both.

Evidence from our study suggests that parents place a much higher value on the survival of their children than \$1 million. One can use the results in Figures 2 and 3 to estimate the distribution of the value of statistical life in the subjects from the two countries. The point at which the probability of purchase was 50% in France was 80 which would be consistent with valuing a statistical life at 5.2 million. The corresponding number for German parents was 3.3 million. Few if any estimates of the value of statistical life are based on parents acting on the behalf of children. The estimates here may not be comparable to other estimates because it is possible that when parents make choices involving payments in exchange for risk reduction they include not only

estimates of the value of the child's life to the child, but also their own selfish interests in enjoying the child's continued survival.

Even assuming a higher value placed on human life, the data from the study cannot be fully reconciled with a rational choice model of decision making. Emotional reactions such as fear and love do not play a role in rational choice models, but they seem to have influenced the respondents. Paradoxically, the data show that greater knowledge about the technical properties of the vaccine, e.g. the nature of serogroup coverage, and exposure to a dramatic display of the effects of the disease could lower the probability of purchase. German subjects who were exposed to a video depicting the shocking story of a woman who develops meningococemia and suffers amputations were less likely to indicate that they would purchase meningococcal vaccine for their children. It is possible that these results were an example of a *fear reversal* - phenomenon well known to marketing experts. Fear reversals were first noted in field studies when high school freshmen who were given more extensive information on the awful outcomes of poor dental hygiene were less likely to change their dental care practices [13]. Since then paradoxical effects of fear appeals have been a commonplace observation in the communications literature and are thought by some to be mediated by a parallel affective response to the emotional content of communication [14].

It is unlikely that these effects are being driven by inclusion or exclusion of parents who either irrationally prefer dominated vaccines or who do not understand what a serogroup is. Separate analyses confirm that whether or not these groups of parents are included or excluded that the effects of the video exposure on demand remain robust.

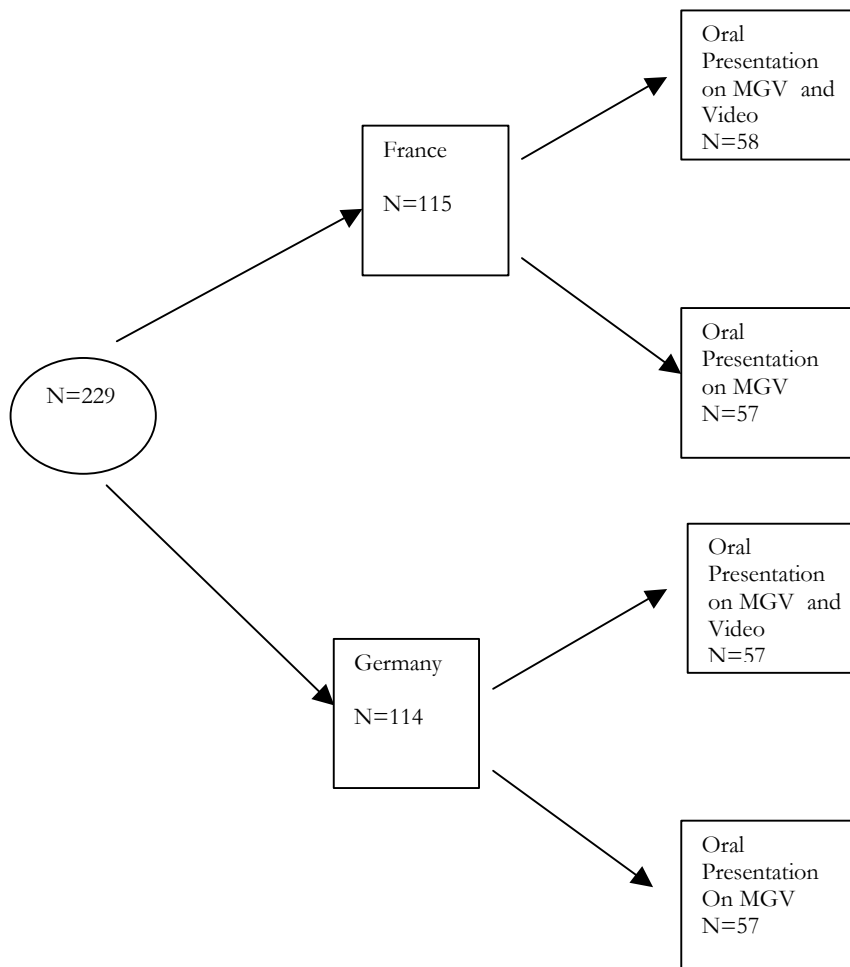
## **Conclusion**

The majority of parents surveyed in France and Germany would purchase a meningococcal vaccine. This expression of interest is consistent with the experience in the U.S. where meningococcal vaccine is a successfully marketed product. This analysis offers a cautionary lesson in the use of model-based evaluations of pharmaceuticals. The parents in this survey varied greatly in their willingness to pay for the vaccine. Furthermore unlike policy-modelers who make sterile assumptions about the value of an unidentified statistical life, the parents in this survey like all real parents had to make emotionally laden decisions about purchases that could save the lives of their identified and cherished children. The rule of rescue observes that saving identified lives is worth more than saving statistical lives [15], but in the end all lives are identified and valued primarily by families. Ignoring what families say about these values cannot be a good foundation for policy. This paper presents data from families and reveals a higher level of concern for risk protection than was assumed in previous models. It also reveals that the value of risk protection is not uniform for all families.

Models that assume that all parents place a uniform low value on risk reduction could potentially deny a beneficial product to a vast number of people whose valuation exceeds the one assumed by the model. In the case of meningococcal vaccine, these results suggest that it may have been premature to conclude that the product is not cost-beneficial without better information on the value placed by parents on lowering the risk of this disease in their children.

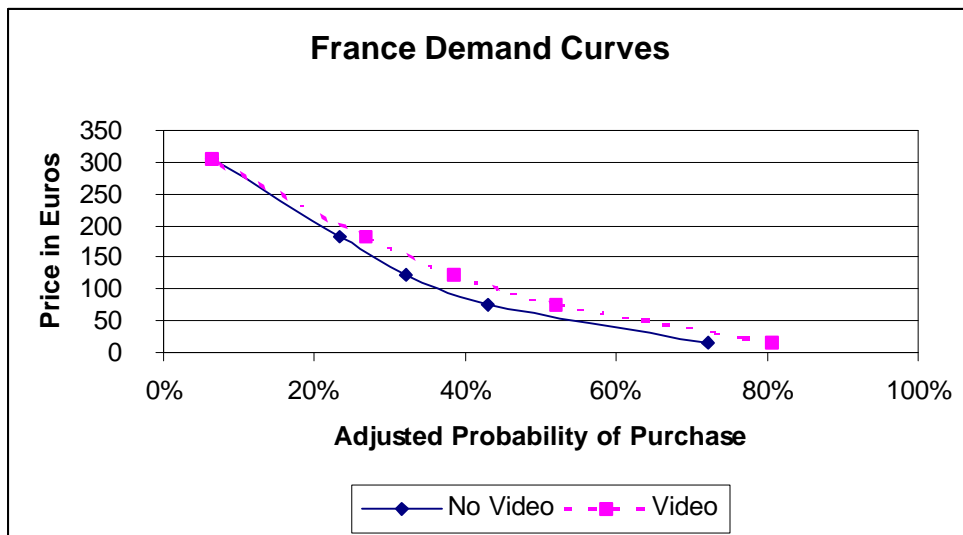
## **Tables**

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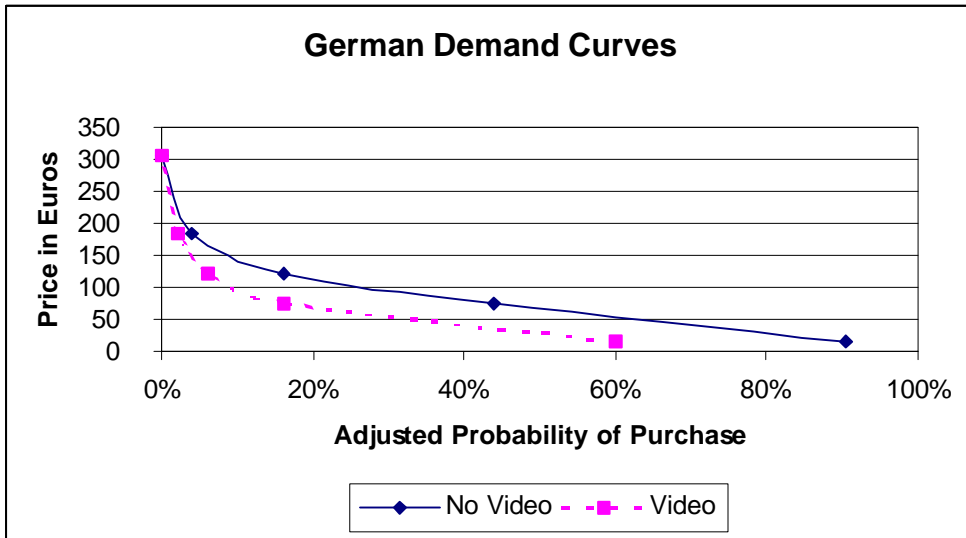


**Figure 1. Study Design.** A total of 229 subjects were recruited, 114 in Germany, and 115 in France. All received an oral presentation on meningococcal vaccine (MGV). Half of all subjects watched a video presentation about a woman who developed meningococemia.

**Figure 2** A plot of vaccine prices vs. median of adjusted probability of purchase for subjects in France. Solid line indicates responses of subjects who were only given a verbal presentation of standardized facts about meningococcal disease. Dotted line indicates responses of subjects who viewed the video depicting the story of a woman who acquired meningococemia as well as the standardized facts about the disease.



**Figure 3** A plot of vaccine prices vs. median of adjusted probability of purchase in Germany as per model in Tables 6. Solid line indicates responses of subjects who were only given a verbal presentation of standardized facts about meningococcal disease. Dotted line indicates responses of subjects who viewed the video depicting the story of a woman who acquired meningococemia as well as the standardized facts about the disease.



<b>Table 1.</b> Descriptive data on the sample.				
	France Video	France No Video	Germany Video	Germany No Video
	N (%)	N(%)	N(%)	N(%)
Number of respondents	58	57	57	57
Female	52 (89.7%)	47 (82.5%)	53 (93%)	49 (86%)
Understood meaning of word serogroup	40 (68.9%)	42 (73.7%)	21 (36.8%)	37 (64.9) ***
Respondent is Employed	42 (72.4%)	38 (66.7%)	45 (78.9%)	47 (82.4%)
Prefer a dominated choice	8 (13.7%)	18 (31.5%) **	13 (22.8%)	15 (26.3%)
Unwilling to purchase vaccine at any price between 15 -304	4 (6.9%)	3 (5.3%)	8 (14.0%)	2 (3.5%)**
	Mean [SD]	Mean [SD]	Mean [SD]	Mean [SD]
Number of Children	2.45 [.939]	2.33 [1.005]	1.75 [.695]	1.75 [.662]
Perceived risk of meningitis in university students (cases per 100,000 person years)	3.52 [2.33]	2.93 [2.00]	2.87 [1.94]	3.05 [1.94]
Log Income (in Logged Euros)	10.19 [0.85]	10.27 [0.79]	11.18 [0.23]	11.26 [0.21]
<p>Subjects were asked to estimate the number of cases that would occur on a campus of 50,000 in 5 years. They were given several choices between 1 and 15 cases. <i>True incidence is estimated at 2 cases per 100,000 person years.</i></p> <p>** Within country difference statistically significant at <math>p &lt; 0.05</math></p> <p>*** Within country difference statistically significant at <math>p &lt; 0.01</math></p>				

**Table 2. France Video Viewers**

Logit Coefficients for Probability of Purchase in France for Video Viewers				
	1	2	3	4
	Logit	Conditional Logit	Logit	Elasticity from Model 3
Own Price	-0.011 (0.001) ***	-0.012 (0.001) ***	-0.011 (0.001) ***	<b>-1.204</b> (0.132) ***
Price of Alternative 1	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.126 (0.095)
Price of Alternative 2	0.004 (0.001) ***	0.004 (0.001) ***	0.004 (0.001) ***	0.424 (0.091) ***
Own Duration in Years	0.059 (0.026) **	0.068 (0.024) **	0.059 (0.026) **	0.342 (0.152) **
Duration of Alternative 1	-0.072 (0.028) ***	-0.079 (0.023) ***	-0.072 (0.029) ***	-0.386 (0.153) ***
Duration of Alternative 2	-0.199 (0.031) ***	-0.225 (0.027) ***	-0.200 (0.031) ***	-1.136 (0.184) ***
Own Number of Antigens	0.556 (0.104) ***	0.601 (0.066) ***	0.562 (0.084) ***	0.989 (0.150) ***
Number of Antigens of Alternative 1	-0.645 (0.104) ***	-0.689 (0.082) ***	-0.650 (0.104) ***	-0.987 (0.163) ***
Number of Antigens of Alternative 2	-0.671 (0.091) ***	-0.723 (0.071) ***	-0.678 (0.091) ***	-1.387 (0.194) ***
Log Income			-0.055 (0.075)	-0.448 (0.616)
Perceived Risk			-0.150 (0.058) ***	-0.216 (0.084) ***
Knows what a serogroup is			-0.390 (0.131) ***	-0.213 (0.072) ***
Constant	2.565 (0.753) ***		3.668 (1.090) ***	
Hausman Probability of Observing this Hausman Under the Null that conditional logit is fully efficient		6.920 0.6457		

Robust standard errors are in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 3 France No Video**

Logit Coefficients for Probability of Purchase in France for Non Video Viewers				
	1	2	3	4
	Logit	Conditional Logit	Logit	Elasticity from Model 3
Own Price	-0.010 (0.001) ***	-0.011 (0.001) ***	-0.010 (0.001) ***	<b>-1.172</b> (0.160) ***
Price of Alternative 1	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.102 (0.130)
Price of Alternative 2	0.004 (0.001) ***	0.005 (0.001) ***	0.005 (0.001) ***	0.538 (0.111) ***
Own Duration in Years	0.117 (0.033) ***	0.142 (0.028) ***	0.123 (0.034) ***	0.725 (0.202) ***
Duration of Alternative 1	-0.066 (0.035) **	-0.074 (0.026) ***	-0.067 (0.035) **	-0.368 (0.195) **
Duration of Alternative 2	-0.192 (0.035) ***	-0.229 (0.030) ***	-0.205 (0.036) ***	-1.226 (0.224) ***
Own Number of Antigens	0.442 (0.112) ***	0.521 (0.076) ***	0.455 (0.089) ***	0.828 (0.164) ***
Number of Antigens of Alternative 1	-0.494 (0.112) ***	-0.515 (0.088) ***	-0.522 (0.116) ***	-0.826 (0.188) ***
Number of Antigens of Alternative 2	-0.702 (0.104) ***	-0.755 (0.084) ***	-0.744 (0.108) ***	-1.569 (0.240) ***
Log Income			0.193 (0.113) *	1.642 (0.964) *
Perceived Risk			-0.042 (0.081)	-0.053 (0.102)
Knows what a serogroup is			-0.258 (0.180) *	-0.164 (0.114) *
Constant	1.833 (0.923) **		0.243 (1.544) **	
Hausman Probability of Observing this Hausman Under the Null that conditional logit is fully efficient		30.700 0.0001		

Robust standard errors are in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 4. Germany Video**

Logit Coefficients for Probability of Purchase in Germany for Video Viewers				
	1	2	3	4
	Logit	Conditional Logit	Logit	Elasticity from Model 3
Own Price	-0.014 (0.002) ***	-0.016 (0.001) ***	-0.014 (0.002) ***	<b>-1.847</b> (0.219) ***
Price of Alternative 1	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.009 (0.159)
Price of Alternative 2	0.002 (0.001) ***	0.004 (0.001) ***	0.003 (0.001) ***	0.325 (0.129) ***
Own Duration in Years	0.014 (0.035) ***	0.041 (0.033) ***	0.017 (0.035) ***	0.111 (0.234) ***
Duration of Alternative 1	-0.074 (0.038)	-0.081 (0.030)	-0.073 (0.038)	-0.451 (0.237)
Duration of Alternative 2	-0.127 (0.037) ***	-0.160 (0.033) ***	-0.129 (0.037) ***	-0.859 (0.248) ***
Own Number of Antigens	0.318 (0.141) ***	0.450 (0.087) ***	0.324 (0.103) ***	0.659 (0.210) ***
Number of Antigens of Alternative 1	-0.741 (0.141) ***	-0.745 (0.119) ***	-0.741 (0.141) ***	-1.305 (0.254) ***
Number of Antigens of Alternative 2	-0.596 (0.114) ***	-0.667 (0.094) ***	-0.599 (0.116) ***	-1.410 (0.276) ***
Log Income			-0.102 (0.385)	-1.057 (4.000)
Perceived Risk			0.251 (0.091) ***	0.332 (0.122) ***
Knows what a serogroup is			-0.301 (0.184) *	-0.102 (0.062) *
Constant	2.599 (1.007) **		3.452 (4.443) **	
Hausman Probability of Observing this Hausman Under the Null that conditional logit is fully efficient		125.350 0		

Robust standard errors are in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

**Table 5. Germany No Video**

Logit Coefficients for Probability of Purchase in Germany for Non Video Viewers				
	1	2	3	4
	Logit	Conditional Logit	Logit	Elasticity from Model 3
Own Price	-0.019 (0.002) ***	-0.022 (0.001) ***	-0.020 (0.002) ***	<b>-2.481</b> (0.235) ***
Price of Alternative 1	0.001 (0.001)	0.001 (0.001) *	0.001 (0.001)	0.139 (0.145)
Price of Alternative 2	0.003 (0.001) ***	0.004 (0.001) ***	0.003 (0.001) ***	0.326 (0.128) ***
Own Duration in Years	0.063 (0.035) ***	0.100 (0.034) ***	0.060 (0.035) *	0.386 (0.224) ***
Duration of Alternative 1	-0.062 (0.037)	-0.060 (0.029) *	-0.065 (0.037)	-0.395 (0.226)
Duration of Alternative 2	-0.180 (0.036) ***	-0.211 (0.032) ***	-0.183 (0.036) ***	-1.210 (0.243) ***
Own Number of Antigens	0.632 (0.107) ***	0.785 (0.092) ***	0.634 (0.109) ***	1.265 (0.221) ***
Number of Antigens of Alternative 1	-0.263 (0.113) ***	-0.204 (0.104) ***	-0.279 (0.124) ***	-0.487 (0.217) ***
Number of Antigens of Alternative 2	-0.392 (0.113) ***	-0.419 (0.094) ***	-0.404 (0.115) ***	-0.938 (0.270) ***
Log Income			-0.516 (0.424)	-5.323 (4.371)
Perceived Risk			-0.038 (0.096)	-0.050 (0.126)
Knows what a serogroup is			-0.571 (0.205) ***	-0.050 (0.126) ***
Constant	1.177 (0.977)		7.606 (4.835)	
Hausman Probability of Observing this Hausman Under the Null that conditional logit is fully efficient		-22.090 --		

Robust standard errors are in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.10

TABLE 6 Logit Coefficients Accounting for Complex Error Distribution--  
Generalized Linear Random Effects Logit Probability of Purchase

	France	Germany
Own Price	-0.013 (0.001) ***	-0.032 (0.002) ***
Price of Alternative 1	0.002 (0.001) **	0.003 (0.001) **
Price of Alternative 2	0.132 (0.026) ***	0.005 (0.001) ***
Own Duration in Years	0.132 (0.026) ***	0.161 (0.043)
Duration of Alternative 1	-0.096 (0.025) ***	-0.070 (0.039) *
Duration of Alternative 2	-0.284 (0.029) ***	-0.268 (0.042) ***
Own Number of Antigens	0.681 (0.075) ***	0.893 (0.130) ***
Number of Antigens of Alternative 1	-0.788 (0.085) ***	-0.782 (0.138) ***
Number of Antigens of Alternative 2	-0.963 (0.082) ***	-0.801 (0.127) ***
Log Income	0.022 (0.156)	-1.397 (0.868)
Perceived Risk	-0.152 (0.120)	0.059 (0.868)
Knows what a serogroup is	-0.484 (0.261) *	-0.828 (0.375) **
Video X Own Price	-0.002 (0.001)	0.007 (0.002) ***
Video	0.500 (0.284) *	-1.968 (0.434) ***
Constant	3.058 (1.850) ***	18.161 (9.780) *

\*p<0.10, \*\* p<0.05, \*\*\*p<0.01

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